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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte THOMAS J. DRURY

Appeal 2009-003247
Application 10/748,302
Technology Center 1700

Decided: September 10, 2009

Before EDWARD C. KIMLIN, ADRIENE LEPIANE HANLON, and
CHUNG K. PAK, *Administrative Patent Judges*.

PAK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from the Examiner's refusal to allow claims 1 through 6 and 8 through 22 (Final Office Action,

mailed February 23, 2006), the only claims pending in the above-identified application.¹ We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

STATEMENT OF THE CASE

The subject matter on appeal is directed to “semiconductor wafer cleaning devices” (Spec. 1). Details of the appealed subject matter are recited in representative claim 1 reproduced from the Claims Appendix to the Appeal Brief (“Br.”), filed October 16, 2008:

1. A cleaning device comprising a shaped body of porous polyvinyl acetal material having a uniform pore size throughout the material with over 90% of the pores ranging from about 7 microns to about 40 microns in size.

The Examiner relies on the following evidence to establish unpatentability (Ans. 3):

Rosenblatt	US 4,098,728	Jul. 4, 1978
Cercone	US 6,027,573	Feb. 22, 2000
Bahten	US 6,076,662	Jun. 20, 2000

Appellant requests review of the Examiner’s rejection of claims 1 through 6 and 8 through 22 under 35 U.S.C. § 102(a) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Bahten, as further evidenced by Cercone and Rosenblatt.² (See App. Br. 5.)

¹ Claim 7 was canceled subsequent to the Examiner’s Answer (“Ans.”), mailed March 22, 2007. (See Miscellaneous Communication, mailed November 28, 2008.)

² To the extent Appellants have separately argued the individual claims on appeal, we will address them separately consistent with the requirements of 37 C.F.R. § 41.37(c)(1)(vii) (2007). A mere reiteration of the limitations recited in the individual claims does not meet the requirements of 37 C.F.R. § 41.37(c) (1)(vii).

Appellant contends that Bahten, as evidenced by Cercone and Rosenblatt, does no teach or suggest the claimed uniform pore size (e.g., App. Br. 11). Appellant also contends that Bahten, as evidenced by Cercone and Rosenblatt, does not teach or suggest the claimed functional limitations such as the fluid flow rate and the mean flow pore pressure recited in claims 9, 10, 15, 17, 18, 19, and 20 (*id.*). Further, Appellant contends that Bahten, as evidenced by Cercone and Rosenblatt, does not teach or suggest reducing the formaldehyde content to less than 0.1 ppm in a roller body made of polyvinyl acetal material as required by claim 21(*id.*). Finally, Appellants contend that the Declaration of Tomas J. Drury of record, along with Exhibits A, B, and C, demonstrates that the claimed subject matter imparts unexpected results (App. Br. 5-9).

ISSUES AND CONCLUSIONS

Has Appellant shown reversible error in the Examiner's finding that Bahten, as explained by Cercone and Rosenblatt, describes the claimed uniform pore size within the meaning of 35 U.S.C. § 102(a)? On this record, we answer this question in the affirmative.

Has Appellant shown reversible error in the Examiner's determination that Bahten, as evidenced by Cercone and Rosenblatt, would have suggested a cleaning device comprising a shaped body made of porous polyvinyl acetal material having the claimed uniform pore size within the meaning of 35 U.S.C. § 103(a)? On this record, we answer this question in the negative.

Has Appellant shown reversible error in the Examiner's determination that the claimed functional limitations such as the fluid flow rate and the mean flow pore pressure recited in claims 9, 10, 15, 17, 18, 19 and 20 would have flowed naturally from following the suggestion of Bahten, Cercone and

Rosenblatt of a cleaning device comprising a shaped roller body made of porous polyvinyl acetal material having the claimed uniform pore size? On this record, we answer this question in the negative.

Has Appellant shown reversible error in the Examiner's determination that Bahten, as evidenced by Cercone and Rosenblatt, would have suggested reducing the formaldehyde content to less than 0.1 ppm in a roller body made of a polyvinyl acetal material as required by claim 21? On this record, we answer this question in the negative.

Has Appellant shown reversible error in the Examiner's finding that Appellants have not demonstrated that the Declaration of Tomas J. Drury of record, along with Exhibits A, B, and C, shows that the claimed subject matter as a whole imparts unexpected results relative to the closest prior art, Bahten? On this record, we answer this question in the negative.

FINDINGS OF FACT ("FF")

1. Bahten teaches a sponge or porous polymeric ultra clean scrubbing brush or surface treatment device useful for the manufacture of semiconductor substrates, hard disks, and the like (col. 1, ll. 23-34).

2. Bahten teaches (col. 3, ll. 44-53) that:

As shown, the devices or porous polymeric products (e.g., foam products) can range in size and shape, depending upon the application. According to an embodiment, the device can be shaped as brush rollers 101, which have protrusions thereon, or brush rollers 103 that have smooth surfaces. These brush rollers have shapes and sizes to meet the particular cleaning application for devices such as semiconductor wafers, hard disks, and other applications. The

device can also be in the form of wipes 105, disks 107, and custom applications 109.

3. Bahten teaches a brush roller made of a polyvinyl acetal porous elastic material having an average pore size of 10 to 200 microns (col. 3, l. 55 to col. 4, l. 19).

4. Bahten exemplifies a brush roller having a length of approximately 25.4 cm, an outside diameter of approximately 6.0 cm (60 mm) and an inside diameter of approximately 3.2cm (32 mm) (col. 11, ll. 35-44).

5. Bahten teaches (col. 4, ll. 20-48) (emphasis added) that:

The polyvinyl acetal porous elastic material usable for the present invention can be produced in any known matter, for example, by dissolving at least one polyvinyl alcohol having an average degree of polymerization of 300 to 3,000, and a degree of saponification of not less than 80%, in water to form a 5% to 30% aqueous solution, adding a foaming agent to the solution, and subjecting the solution to reaction with an aldehyde such as fomaldehyde [sic., formaldehyde] or acetaldehyde until the device becomes water insoluble. The polymer is 50 to 70 mole % of acetal units....

...
Other techniques can also be used to manufacture porous polymeric devices used for surface treatment applications. These techniques include, among others, *an air injected foam* or sponge product.

6. Cercone, like Bahten, teaches a synthetic sponge scrubbing device made of polyvinyl acetal for cleaning semiconductor wafers and thin film disks and other materials (col. 1, ll. 1531).

7. Cercone teaches forming the pores in the device with gas to provide an open pore structure having no fibrils (col. 2, ll. 3-6).

8. Cercone teaches that the specific geometry of the pores can be obtained by varying known reaction parameters (col. 3, ll. 3-7).

9. Cercone teaches (col. 2, ll. 41-46) (emphasis added) that:

A preferred embodiment of the invention is illustrated in FIGS. 1-3. Applicant has discovered that the sponge making process disclosed in U.S. Pat. No. 4,098,728 [issued to *Rosenblatt* on July 4, 1978], the disclosure of which is incorporated herein by reference, can yield a sponge material having 100% open pores *with no "dead end pockets" and no fibrils.*

10. Rosenblatt, included in Cercone, teaches (col. 4, ll. 3-34) (emphasis added) that:

The present invention is based upon discovery that by reacting polyvinyl alcohol and aqueous formaldehyde solution in the presence of an acid catalyst under carefully controlled conditions, a medical sponge having controlled pore size uniformly distributed throughout its volume can be obtained that is expandable, biocompatible, lint free, soft, has fast wicking, and has a high liquid holding capacity. Instantaneous wicking and high liquid holding capacity is attained by controlling the temperature and time conditions and processing procedures by which the formaldehyde and polyvinyl alcohol are mixed and reacted. The formaldehyde and polyvinyl alcohol are mixed warm in the presence of a surfactant to entrain air and to form *pores having a more fibrous thin walled cell geometry and a uniform size distribution*, to maintain the distribution of the pores so formed and to regulate excessive internal

merging of the pores. After reaction and casting, the sponge is heated to quickly cure the outer surface thereof and thus form a relatively stable overall shape. Thereafter, the entire sponge is cured... [and] is washed to *remove the surfactant, acid and unreacted formaldehyde...*

11. Appellant relies on the Declaration executed by Thomas J. Drury (the named inventor in the instant application), along with attached Exhibits A, B. and C, to show that the claimed invention imparts unexpected results relative to the closest prior (App. Br. 6-9).

12. According to Appellant, these exhibits show that:

[T]he present invention has three surprising results over the roller products currently being used in the market place; (1) the *doubling the effective use life* of the roller; (2) a *minus defect rate*; and (3) a significant reduction of chemical and water usage, any of which would be a surprising and unexpected result. [(Emphasis original.) (See App. Br. 6.)]

13. Appellant also asserts that Exhibits B and C show “[o]ther testing and comment by those skilled in the art” and “Exhibit B specifically states that the invention brushes clean twice as good as Rippey brushes and their equivalent” (App. Br. 7 and 9).

14. According to page 1 the Declaration, Exhibit A is said to show a comparison between “BPTOne 212XP material” representative of the claimed invention and “other rollers used in the marketplace including one developed by me.”

15. Exhibit A states that Brush X, Brush Y, BPT-1 Type 186, and 3920-00307, BPT-1 Type 212 were evaluated and concludes that the BPT-1 Type 212 brush has best defect performance.

16. Exhibit A does not provide any details regarding how the tested brushes were made, what materials were used to make the tested brushes, and what pore size distributions were employed in each of the tested brushes.

17. Exhibit A does not show that the alleged "best defect performance" is due to the claimed uniform pore sizes or unclaimed methods for making the brushes, unclaimed ingredients used for making the brushes and/or any other unclaimed features of the brushes.

18. Exhibit A does not show that brushes X, Y, and BPT-1 Type 186 are representative of the closest prior art, Bahten.

19. According to pages 1 and 2 of the Declaration, Exhibit B shows that "the inventive roller brushes of the present invention designated BPTOne were also tested in the comparative testing by Motorola Inc. against Rippey brushes."

20. According to page 2 of the Declaration:

That Rippey brushes are believed to be those disclosed by Bahten Patent No. 6,076,662 (assigned to Rippey Corporation). Rippey Corporation had previously distributed the Kanebo brush (See the Tomita Patent Number 4,566,919).

21. The Declaration does not indicate that Mr. Thomas J. Drury, a declarant, has any personal knowledge of the experiment carried out by Motorola Inc. to know what was actually tested in Exhibit B.

22. Exhibit B asserts that the "BPT one Brushes clean twice as good then Rippey brushes and their equivalent."
23. Exhibit B does not provide any details regarding how the brushes tested were made, what materials were used to make the brushes tested, and what pore size distributions were employed in each of the tested brushes.
24. Exhibit B does not identify any of the characteristics of the tested brushes and/or identify any of the Rippey brushes as Bahten's brushes or their equivalents.
25. Exhibit B does not show whether the alleged improvement is due to the claimed uniform pore sizes or unclaimed methods for making the brushes, unclaimed ingredients used for making the brushes and/or any other unclaimed features of the brushes.
26. Exhibit B does not indicate that the tested Rippey brushes correspond to those described in the closest prior art, Bahten.
27. Exhibit C is an e-mail containing comments by Hal Bailey, which states that the use of the BPT one brushes represents a substantial cost saving compared to using Rippey brushes.
28. Exhibit C does not identify any of the characteristics of the tested brushes and/or identify any of the Rippey brushes as Bahten's brushes or their equivalents.
29. Exhibit C does not provide any details regarding how the tested brushes were made, what materials were used to make the tested brushes, and what pore size distributions were employed in each of the tested brushes.

PRINCIPLES OF LAW

As stated in *KSR Int'l Co., v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007):

“[A]nalysis [of whether the subject matter of a claim would have been *prima facie* obvious] need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”

“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”
Id. at 416.

Consistent with the above principle of law, our reviewing court stated in *In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003):

In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a *prima facie* case of obviousness . . . We have also held that a *prima facie* case of obviousness exists when the claimed range and the prior art range do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985).

Moreover, it is well settled that the recognition of another advantageous feature flowing naturally from following the suggestion of the applied prior art cannot be the basis for patentability when the difference would otherwise be obvious. *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985); see also *In re Papesch*, 315 F.2d 381, 391 (CCPA 1963) (“a compound and its properties are inseparable”).

A showing of unexpected results may be sufficient to overcome a *prima facie* case of obviousness. *In re Dillon*, 919 F.2d 688, 692-93 (Fed.

Cir. 1990) (internal citations omitted); *see also In re Skoner*, 517 F.2d 947, 948 (CCPA 1975) (Expected results are evidence of obviousness just as unexpected results are evidence of unobviousness). However, the burden of analyzing and explaining data to support nonobviousness rests with Appellant. *In re Klosak*, 455 F.2d 1077, 1080 (CCPA 1972). Appellant must show that the showing relied upon actually demonstrates unexpected results relative to the closest prior art, *In re Baxter Travenol Labs.*, 952 F.2d 388, 392 (Fed. Cir. 1991) and is commensurate in scope with the degree of protection sought by a claim, *In re Grasselli*, 713 F.2d 731, 743 (Fed. Cir. 1983); *In re Clemens*, 622 F.2d 1029, 1035 (CCPA 1980). Appellant also must show that the showing is truly comparative such that the cause and effect sought to be proven is not lost in the welter of unfixed variables. *In re Dunn*, 349 F.2d 433, 439 (CCPA 1965).

On appeal to this Board, Appellant must show that the Examiner reversibly erred in finally rejecting the claims. Cf. *In re Kahn*, 441 F.3d 977, 985-986 (Fed. Cir. 2006); *see also* 37 C.F.R. § 41.37(c)(1)(vii) (2007).

ANALYSES

The claimed subject matter is directed to a semiconductor cleaning device comprising a shaped body, such as a roller, made of porous polyvinyl acetal material having a uniform pore size throughout the material. Claims 1, 10, 18, and 20 define the claimed uniform pore size as “over 90% of the pores ranging from about 7 microns to about 40 microns in size,” while claims 6, 12, 13 and 16 define the claimed uniform pore size as “at least 95% of the pores being less than 40 microns in size”. Claims 5 and 16

further limit the claimed uniform pore size as “an average pore size of about 20 microns” and “a mean flow pore size of about 20 microns,” respectively.

Claims 9, 10, 15, 17, 18, 19, and 20 further recite functional limitations, such as a fluid flow rate, a wet flow rate, a dry flow rate, a solvent flow rate, and a mean flow pore pressure. According to page 7 of the Specification, such functional limitations necessarily or naturally flow from the claimed uniform pore sizes.

Claim 21 further recites that the roller body polyvinyl acetal material of claim 18 “has less than 0.1 ppm formaldehyde.” The claimed formaldehyde content in the roller body polyvinyl acetal material can be zero.

As indicated *supra*, Bahten teaches a sponge or porous polymeric ultra clean scrubbing brush useful for cleaning semiconductors. Bahten teaches the ultra clean scrubbing brush in the form of a roller made of a polyvinyl acetal porous elastic material having an *average pore size* of 10 to 200 microns. As also explained by Cercone and Rosenblatt, the polyvinyl acetal porous roller brush useful for cleaning semiconductor wafers produced by methods, inclusive of that suggested by Bahten, has pores having those average sizes (uniform sizes). Specifically, when the pores are formed with air (gas) as suggested by Bahten, the resulting roller cleaning device, according to Cercone and Rosenblatt, has an uniform open pore structure having no “dead pockets” and no fibril. Although Bahten’s polyvinyl acetal porous elastic material has an average pore size of 10 to 200 microns, which only partially overlaps with the claimed uniform pore sizes, our reviewing court stated in *Peterson*, 315 F.3d at 1329 that:

In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a *prima facie* case of obviousness We have also held that a *prima facie* case of obviousness exists when the claimed range and the prior art range do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985).

Accordingly, we determine that Bahten would have rendered a semiconductor cleaning roller brush made of a polyvinyl acetal porous elastic material having the claimed uniform pore sizes, e.g., an *average pore size* of about 20 microns, *prima facie* obvious to one of ordinary skill in the art.³

In reaching the above determination, we have considered Appellant's argument at page 7 of the Appeal Brief that Bahten, Cerccone, and Rosenblatt are not combinable since they use different pore formers. According to Appellant (*id*), Bahten, Cerccone, and Rosenblatt are not compatible sine Bahten uses starch as a pore former, whereas Rosenblatt and Cerccone use air as a pore former. However, as correctly pointed out by the Examiner, Bahten does not require employing a starch pore former in preparing its polyvinyl acetal porous elastic material. In fact, Bahten teaches employing air pore former as indicated *supra*. In other words, Bahten and Cerccone

³ Bahten's disclosure of an average pore size range (with or without Cerccone's and Rosenblatt's disclosure of uniform pore sizes) partially overlaps with the claimed uniform pore size range. Such a disclosure does not constitute an anticipatory description of the claimed uniform pore sizes within the meaning of 35 U.S.C. § 102(a). *Peterson* states that such a partial overlapping range situation establishes a *prima facie* case of obviousness within the meaning of 35 U.S.C. § 103(a).

(which includes Rosenblatt) and Rosenblatt are all directed to forming a semiconductor cleaning roller brush made of a polyvinyl acetal porous elastic material prepared from using air as a pore former. More importantly, however, Cercone and Rosenblatt, as discussed *supra*, teach the advantage of using air pore former. As such, contrary to Appellant's argument at page 7 of the Appeal Brief, the collective teachings of Bahten, Cercone and Rosenblatt would have led one of ordinary skill in the art to employ air as a pore former in forming pores in a polyvinyl acetal porous elastic material used in Bahten's semiconductor roller cleaning device, motivated by a reasonable expectation of successfully forming a polyvinyl acetal porous elastic material having an uniform open pore structure without any "dead pockets" and fibril.

As to the separately argued functional limitations recited in claims 9, 10, 15, 17, 18, 19, and 20, we concur with the Examiner that they would have naturally flowed from the suggestion of Bahten of the claimed semiconductor cleaning roller brush made of a polyvinyl acetal porous elastic material having the claimed uniform pore sizes. *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985) (the recognition of another advantageous feature flowing naturally from following the suggestion of the applied prior art cannot be the basis for patentability when the difference would otherwise be obvious). *Ex parte Obiaya*, 227 USPQ 58, 60 (BPAI 1985); *see also In re Papesch*, 315 F.2d 381, 391 (CCPA 1963) ("a compound and its properties are inseparable"). This is especially true in this situation since the functional limitations, such as the claimed fluid flow rate passing through the pores and the claimed mean flow pore pressure, are acknowledged to be the necessary functions of the claimed uniform pore sizes suggested by Bahten.

As to the separated argued formaldehyde impurity content recited in claim 21, Bahten teaches that its polyvinyl acetal porous elastic material can be prepared using acetaldehyde (without formaldehyde). Thus, Bahten would have suggested a roller brush made of a polyvinyl acetal porous elastic material having the claimed formaldehyde content of 0 to 0.1 ppm. Even when Bahten employs formaldehyde in preparing its polyvinyl acetal porous elastic material, Bahten teaches removing impurities. When formaldehyde is used in preparing a polyvinyl acetal porous elastic material used for forming a semiconductor cleaning roller brushes, Cercone and Rosenblatt explain the need to remove any unreacted formaldehyde impurities. Thus, we concur with the Examiner that one of ordinary skill in the art would have been led to form a semiconductor cleaning roller brush made of a polyvinyl acetal porous elastic material having the claimed formaldehyde content of 0 to 0.1 ppm.

As a rebuttal to the *prima facie* case established by the Examiner, Appellant relies on a Declaration executed by Thomas J. Drury (the named inventor in the instant application), along with attached Exhibits A, B, and C, to show that the claimed invention imparts unexpected results relative to the closest prior art, Bahten. However, the preponderance of evidence supports the Examiner's finding that the Declaration and Exhibits do not provide facts sufficient to show that the alleged improvements are based on a comparison between the claimed subject matter and the closest prior art, Bahten. Nothing in the Declarations and Exhibits indicates that any of the experiments mentioned involved the cleaning device taught by Bahten. The only reference to Bahten's cleaning device is speculation on the part of the

inventor-declarant (Mr. Thomas Druary) who had no personal knowledge of the actual experiment carried out by Motorola, Inc.

The Declaration and Exhibits also do not provide sufficient facts to show that the alleged improvements are due to the claimed features and are applicable to the entire scope of the claimed invention. In this regard, we note that both the Declaration and the Exhibits are devoid of any details regarding how the tested brushes were made, what materials were used to make the tested brushes, and what pore size distributions were employed in each of the tested brushes. They do not identify any of the characteristics of the tested brushes. Thus, it cannot be ascertained from the Declaration and the Exhibits whether the alleged improvements are due to the claimed uniform pore sizes, or the unclaimed features, such as the unclaimed method of making the claimed roller brush and the unclaimed acetal or impurity content in a polyvinyl acetal porous elastic material used to make the claimed brush. Nor can it be ascertained from the Declaration and the Exhibits that the showing directed to the alleged improvements is reasonably commensurate in scope with the degree of protection sought by the claims on appeal.

Accordingly, based on the totality of record, including due consideration of Appellant's arguments and evidence, we determine that the preponderance of evidence weighs most heavily in favor of obviousness within the meaning of 35 U.S.C. § 103(a).

CONCLUSION

In view of the foregoing, we reverse the Examiner's decision rejecting the claims on appeal under § 102(a), but affirm the Examiner's decision rejecting the claims on appeal under § 103(a).

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Accordingly, the decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(v).

AFFIRMED

tc

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